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INTRODUCTION

TO VOL. THE THIRD.

An Essay on those inquiries in Natural Philosophy, which at present are most beneficial to the UNITED STATES OF NORTH AMERICA. By DR. NICHOLAS COLLIN, Rector of the Swedish Churches in Pennsylvania.

Read before the Society the 3d of April, 1789.

PHILOSOPHERS are citizens of the world; the fruits of their labours are freely distributed among all nations; what they sow is reaped by the antipodes, and blooms through future generations. It is, however, their duty to cultivate with peculiar attention those parts of science, which are most beneficial to that country in which Providence has appointed their earthly stations. Patriotic affections are in this, as in other instances, conducive to the general happiness of mankind, because we have the best means of investigating those objects, which are most interesting to us. In the present circumstances of the United States some problems of natural philosophy are of peculiar importance; a survey of these may contribute to the most useful direction of our own inquiries, and those of our ingenious fellow citizens. I submit, gentlemen, my reflections on this subject to your candid indulgence and enlightened judgment.

1. ARTICLE, *Medical Enquiries.*

All countries have some peculiar diseases, arising from the climate, manner of living, occupations, predominant passions, and other causes, whose separate and combined influence is but imperfectly known. In North America we may count five—nervous disorders, rheumatism, intermitting fevers, loss of teeth, and colds. It is remarkable that nervous complaints are at present more frequent in Europe than they formerly were. They spring in a great measure from the indulgencies of a civilized life; but in America these fiends infest with less discriminati-

on the dwellings of industry and temperance. Proteus-like they assume every shape, and often baffle the best physicians. Their baneful effect on the mind requires the serious attention of legislators, divines, and moral philosophers: I have myself often seen their amazing influence on religious sentiments. When extreme, they derange the whole system; obscure the intellects, bewilder the imagination; prevent the natural order and operation of all the passions: the soul vibrates between apathy and morbid sensibility: she hates when she should love; and grieves when she ought to rejoice: she resembles a disordered clock, that after a long silence chimes till you are tired, and often instead of one strikes twelve—These extremes are indeed rare; but the more general degrees are still analogous, and produce a great sum of evil.

Slight rheumatic pains are almost epidemic in some seasons of the year. Yet, these are scarcely worth mentioning in comparison to the severe fits that afflict a great number of persons, even in the earlier parts of life, growing more frequent and violent with age; not seldom attended with lameness, and contraction of limbs.

Fever and ague is here, as in other countries, the plague of marshy and fenny situations, but what is singular, it also visits the borders of limpid streams. The lesser degree of it generally called *dumb ague*, is not rare in the most salubrious places during the months of September and October. Through all the low countries from north to south this disease rages in a variety of hideous forms; and chiefly doth the surly *quartan* with livid hue, haggard looks, and trembling skeleton-limbs, embitter the life of multitudes: I have known many to linger under it for years, and become so dispirited, as not even to seek any remedy. It is a foul source of many other diseases; often terminating in deadly dropries and consumptions.

Premature loss of teeth is in many respects a severe misfortune. By impairing mastication, and consequently digestion, it disposes for many disorders. It injures the pronunciation; and is a particular disadvantage in a great republic, where so many citizens are public speakers. It exposes the mouth and throat to cold, and various accidents. It diminishes the pleasure of eating, which is a real though not sublime, pleasure of life; and which I have heard some persons very emphatically regret. Finally, it is a mortifying stroke to beauty; and as such deeply felt by the fair sex! Indeed that man must be a stoic, who can without pity behold a blooming maiden of eighteen afflicted by this infirmity
of

of old age! This consideration is the more important, as the amiable affections of the human soul are not less expressed by the traits and motions of the lips, than by the beaming eye. I have not mentioned the pains of tooth-ach, because they are not more common or violent in this country than in some others, where loss of teeth is rare; many persons here losing their teeth without much pain, as I have myself experienced.

The complaint of *catching cold* is heard almost every day, and in every company. This extraordinary disorder, little known in some countries, is also very common in England. An eminent physician of that country said that "colds kill more people than the plague". Indeed many severe disorders originate from it among us: it is probably often the source of the before mentioned chronic diseases. When it does not produce such funest effects, it is nevertheless a serious evil; being attended with loss of appetite, hoarseness, sore eyes, head-ach, pains and swellings in the face, tooth and ear-ach, rheums, listless languour and *lowness of spirits*: wherefore *Shenstone* had some reason to call this uneasiness a *checked perspiration*. Great numbers in the United States experience more or less these symptoms, and are in some degree valetudinarians for one third of the year.

Eminent medical authors have indeed treated of these distempers; and some American physicians deserve applause for their theoretical and practical exertions. Still, it is devoutly to be wished that these national evils may draw a more pointed attention. The limits of my design permit only a few additional remarks.

These distempers frequently co-exist in the most unhealthy parts of the country; and not seldom afflict individuals with united force. Compassion for suffering fellow citizens ought in this case to animate our investigation of those general and complicated local causes. The extreme variableness of the weather is universally deemed a principal and general cause of colds, and of the disorders by them produced; the fall and rise of the thermometer by 20 a 30 degrees within less than four and twenty hours, disturbing the strongest constitutions, and ruining the weak. A most important desideratum is therefore the art of hardening the bodily system against these violent impressions; or, in other words, accommodating it to the climate. The general stamina of strength support it under the excesses of both cold and heat. The latter is, however, the most oppressive as we can less elude it by artificial conveniencies. We suffer especially

especially during the summer four, til 6 a 8, critical extremes, when the thermometer after 86 a 92 degrees, falls suddenly to 60. Could means be found to blunt these attacks on the human constitution, they would save multitudes from death and lingering diseases. Sometimes this crisis happens as late as medium September, and is in a few days succeeded by the autumnal frosts: in such case weak persons receive a shock, from which they cannot recover during the autumn, and which will aggravate the maladies of the winter, especially when it is early and rigorous.

Searching for general causes of the mentioned distempers in the popular diet, we should examine the following circumstances—excessive use of animal food, especially pork: the common drink of inferior spiritous liquors both foreign and home made; not to mention a too frequent intemperance even in the best kinds: the constant use of tea among the fair sex, drank generally very hot and strong; and often by the poorer classes, of a bad quality.

In the general modes of dress we plainly discern these defects:—the tight-bodied clothes, worn by both sexes, encrease the heat of a sultry summer; the close lacing and cumbersome head-dresses of the ladies are especially injurious to health. The winter-cloathing is too thin for the climate of the northern and middle states, which is for several months at times equally cold with the North of Europe. Few persons preserve their feet from the baneful dampness of the slush occasioned by the frequent vicissitudes of hard frosts and heavy rains during the winter: women generally wear stuff-shoes: the American leather, though otherwise good, is very spongy; a defect owing to the precipitate process of tanning. Nor does either sex guard the head against the piercing north-west wind which is so general for five or six months: on journeys especially, the men should exchange their hats for caps that cover the ears and cheeks.

In the modes of lodging these improprieties are observable:—the poorer, or more indolent people, especially in the less improved parts of the country, frequently dwell in houses that are open to the driving snow, and chilling blast: good houses often want close doors; a chasm of six or eight inches near the floor admits a strong current of cold air, which sensibly affects the legs. Such houses cannot be sufficiently warmed by the common fire-places; hence the frequent complaint, that the fore part of the body is almost roasted, while the back is freezing: a situation very unnatural, productive of rheumatism and other distempers. The

larger

larger towns of North-America have, with their spacious streets, a number of narrow alleys ; which are peculiarly detrimental in a fultry climate, and in co-operation with the slovenly habits of their poorer inmates, are nurseries of disease.

Among the general customs which may influence health, the most striking is an excessive, and in some cases ill-judged cleanliness : the continual washing of houses, especially in the cold season, has, I am confident, cost the lives of many estimable women, and entailed painful diseases on their families.

In the business of life we often remark a very irregular application ; indolence succeeded by hurry and intense fatigue. This must particularly injure our husbandmen, as the neglect of a day may damage a precious crop, if it is not compensated by exertions, which in the fultry heat of summer are very trying to the strongest constitution.

As to nervous disorders, philanthropy compels me to remark, that, besides their general connexion with a sickly constitution, they have in a great measure originated from two singular causes. One is the convulsion of public affairs for a considerable time past, which occasioned many and great domestic distresses : the natural events of the late war are universally known : numbers of virtuous citizens have also felt the dire effects of the succeeding anarchy ; especially in the loss of property.* The operations of this cause are, however, continually lessened by time that cures our griefs, or buries them in the grave ; and such evils will under Providence be for ever prevented by the new confederation of the United-States—The other cause is that gloomy superstition disseminated by ignorant illiberal preachers ; the bane of social joy, of real virtue, and of a manly spirit. This phantom of darkness will be dispelled by the rays of science, and the bright charms of rising civilization.†

2. *ARTICLE, Inquiries relative to rural œconomy.*

The United States possess a vast territory fertile in many valuable productions. They will therefore, if truly wise, make agriculture the principal source of prosperity and wealth : to prefer other objects, however useful in a secondary view, would be perverting the order of nature,
nay,

* Not by violence, but the well known disorders of paper money in various forms.

† It is pleasing to see how fanaticism declines with agricultural improvement in many new settlements ; and how refinement of public manners keeps pace with a preference of enlightened teachers.

may, opposing the will of nature's God. Agriculture has made a wonderful progress in several countries, since it became the business and favourite amusement of philosophers and men of taste. We may reap great advantage from the many excellent writings on this subject in the English, French, German, and Swedish languages; but much improvement is yet wanting in every part of this noble science. Besides, our local circumstances require in some cases peculiar methods. The United States extend through several climates; and the general irregularity of the seasons mingles the diversity of climate in every state: Pennsylvania f. e. has often within two or three months the climates of Sweden, England, and Italy. This points out the propriety of adopting some practices from different countries, and establishing others as our own.

On our tillage the following remarks appear to me very interesting.—The succession of severe frosts and deep thaws during winter in all the northern and middle states makes a variety of drains necessary in most soils and situations; yet an almost general neglect of this destroys a great part of the seed: a judicious treatise on the forms and courses of such drains would be very useful. A large portion of the arable lands in this and some other states being hilly, is detrimentally washed by heavy rains in every season of the year: especially is the manure thereby totally lost. This would be much prevented by transverse ploughing in a proper degree of horizontal inclination, which may be traced by computing the force and quantity of the water..

The Indian corn * is an essential article among American grains; and peculiarly suitable to an extensive country. It might be raised at so moderate a price as to bear exportation to Europe; in the northern parts of which it would be very valuable as nourishment for domestic animals during the long winter. The mode of planting this grain by four or five seeds together in hills at the distance of several feet, appears less reasonable from the consideration, that one part of the ground is left vacant, while the other is over charged; that the contiguous stalks must impede each other; that their spindling height, and close position subjects them more to the high winds, which not unfrequently sweep down whole fields. I am informed by natives of Italy, that in that country the corn is planted so as to cover the ground equally, with convenient intervals for weeding.

The culture of meadows has gained a considerable perfection in the middle states; but still is capable of much improvement. We must dis-

cover

* Maize or zea.

cover a mode of banking effectual against the floods that often ruin the best marsh-meadows: in open situations a close row of some aquatic trees beyond the bank is indispensable for breaking the force of a stormy tide. We want grasses that will flourish in dry and sandy soils: such f. e. as were lately introduced in Spain, and are said to have proved so beneficial to that dry and warm country.

The heat of our summers is unfavourable to grass, where the ground, though fertile, has not a degree of moisture; it is therefore adviseable to try, whether barley, rye, or wheat, if cut young, would make good hay; and whether a second crop or the succeeding pasture, may help to make a full compensation for an eventual harvest? I remember to have heard this method much recommended by some cultivators in a European country. The division of pasture grounds by enclosures is generally neglected. Clean feeding is an advantage of admitting cattle, horses, and sheep in rotation, that deserves attention.

The value of land, and close neighbourhood, makes good fences very necessary in old settlements. Worm-fencing and similar expedients of infant cultivation, should never be seen; they occasion losses, vexation and contention. The regular frames of rails and boards would be much improved by hardening against heat and moisture: to render the lower part of the post more durable, burning, encrusting with mortar, and soaking in salt water, are expedients partly used, and worthy of trial. Live hedges are in general preferable to any, but yet very rare; though the country presents many shrubs of promising qualities.

The vast domains of the United States can vie with any country in the variety, utility, and beauty of trees and shrubs. Our stately forests are a national treasure, deserving the solicitous care of the patriotic philosopher and politician. Hitherto they have been too much abandoned to the axes of rude and thoughtless wood-choppers. What person of sense and feeling can without indignation behold millions of young oaks and hickories destroyed, to make bonfires in open smoaky houses, or trucked in the cities for foreign toys! some parts of Europe were thus laid waste in former centuries; and the present generations must with great labour and expense repair the ravages of their forefathers. In many parts of this country a preservation and increase of the timber for fuel and other domestic uses renders these queries important.—What trees are of the quickest growth? at what age do they increase most? what is the proper distance between them? what is the best mode of pruning, for

promoting the growth, and taking off all superfluous branches? what kinds are suitable to different soils? what species thrive best together? a judicious lopping of the branches, thinning close the clumps of trees, and clearing the ground of underwood, will make many woodlands good pastures, and form them into beautiful parks. This management would also improve the quality of timber by procuring the benefit of sun and air: the want of this may be regarded as one principal cause of the sponginess of our timber, which defect so inimical to durability, strength, and preservation of a given form, is further increased by a too common ignorance or neglect of the proper season for felling the materials of building, furniture, staves and various utensils. Some valuable trees and shrubs are yet obscurely known: among these the so called *coffee-tree* * in the western country, that bears a hard nut, the kernel of which is generally used by the inhabitants as a substitute for coffee; the native plumb trees on the Mississippi, said to be far superior to those in the middle states; the newly discovered and much extolled grape of Scioto.† Many of those which have long been familiar to us, still possess useful qualities little explored. Oil might be extracted from acorns, and especially from the large and greasy species of the chestnut-oak; as lately, though but in few places, is done from the various kinds of walnuts. Spirits may be distilled from the berries of the red cedar, which so much resemble those of the European Juniper. Wine far better, than what is generally done, can be made from the late grapes, as I know by my own experiments. From all kinds of grapes, the Persimon fruit, the berries of the four-gum, ‡ and white-thorn,§ the crab-apple, the wild-pears, plumbs, and cherries, with similar fruits, spirituous liquor, and vinegar may be obtained. This white-thorn will, if it can be kept close and low, make an impenetrable and beautiful hedge, by its long sharp and solid spears, and by its clustering blossoms and large red berries. The new experiment of grafting foreign kinds on our native grape-wines, said to be very promising, may prove a good preservative against the rigour of winter. In all probability many species of leaves would make good fodder for cattle, if gathered in the proper season, and well cured: this expedient practised in the north of Europe* is of great importance to one half of the American states, which have according to situation no pasture
for

* Guilandia.

† A branch of the Ohio.

‡ Nyssa.

§ Crus gally.

* Aspin leaves f. c. are a pleasing and salutary food for horses.

for five a seven months. Finally we may sincerely wish that the owners of venerable woodlands might regard them as principal ornaments of their country; and while they clear a part for the purposes of agriculture, leave those hills crowned with towering pines, and stately oaks; suffering likewise the groves of tulip-trees and magnolias to wave among yellow harvests and blooming meadows. In some of the old countries many gentlemen would purchase such rural charms at any expense, but must wait till the evening of life for the shade of their plantations; is it not then deplorable, that so many American farmers daily destroy what their offspring of better taste will deeply regret! this evil might in a great measure be lessened by a *treatise on ornamental planting* adapted to the present circumstances of this country.

Half a century ago, philosophers thought it beneath them to investigate the œconomy of domestic animals. By this ridiculous pride European countries have suffered much. The Swedish naturalists were roused near thirty years ago, to a serious attention, by a pestilence among horses and horned cattle, which destroyed many thousands in some provinces. In America, this important science has been much neglected. Not to enlarge upon a subject which especially concerns agricultural societies, I shall only mention two or three particulars—This country is not unfavourable to horses; yet those of good quality are not very common, because the natural history of these noble animals is but little cultivated. They are often disabled by want of proper care; and perish by various disorders; especially by swelling in the throat, cholick, and the botts.* Sheep thrive well in some parts, but in others I have seen them die by dozens, without the owners knowing or inquiring into the cause.

Horned cattle suffer much when exposed to the winter's cold, which destroys their hoofs even under the 39 degree. Both they and horses are affected by excess of heat in summer: which not seldom causes a fever, discernible by their want of appetite, dullness, and a yellow tinge of the mouth and eyes. The best European treatises on domestic animals will more or less apply to diverse parts of this country: a book written on sheep, in Swedish, by *Haltfer*, has great merit, and is applicable to the colder states.

Goats would be very valuable in the rocky woodlands of America, as they are in those of Europe. They are very hardy: their maintenance is cheap, as they browse summer and winter on most kinds of trees and shrubs;

* A kind of worms that devours their maw,

shrubs : they yield a great quantity of rich milk : and their skins are very useful.* The Angora goat, whose fine glossy hair is a material of the mohair, may also thrive as well here as in Sweden, where he was introduced by the patriotic Ahströmer.

Good orchards eminently unite the useful and pleasing ; gratifying through the greater part of the year, the taste, scent, and sight. Horticulture was an early object in America, and has made considerable progress. At present our first care should be, to prevent distempers of the fruit-trees, of late become very alarming—Peach-trees, have till within 20 or 30 years been very flourishing : some English writers relate with amazement that the Americans fatten their hogs on this fruit, which is so costly in the North of Europe ; and it is true, that many common farms abounded so far in a promiscuous collection of better and worse. But at present the peach-trees are few, and generally in a sickly condition, through the greater part of the country. Of this one principal cause is a fly, that deposits her eggs within the stem near the ground, which produce a great number of worms, who quickly consume all the lower bark. Most kinds of plum-trees are liable to decay, and the fruit is destroyed by a species of fly ; but the ravages of this insect have been for a long time. Pear-trees have never indeed flourished well, but of late far less : some ascribe the blights of them to lightning, and hang pieces of iron in the branches, to answer the purpose of electric rods. In some places lately cherry and apple-trees have been attacked by various distempers, which cause the fruit to rot, and the limbs to decay in rapid succession till the tree dies. This gangrene in fruit trees bears a strong resemblance to the mortification of members in the human body ; the corruption spreads quickly over a large limb, and amputation is the only preservative of the tree yet known. The loss of peach-orchards is a considerable disadvantage, as their early bloom is the principal beauty of spring ; and the fruit is not only very pleasing both green and preserved, but also yields by distilling an agreeable and wholesome liquor, well known by the name of *peach-brandy*. The apple-orchards claim a solicitous care merely as great ornaments of the country ; much more as they supply a great article of diet and a salutary beverage equal to several species of wine. We want an American *treatise on fruit-trees*, which would show how far the best English authors are applicable to diverse parts of the United States ; give a full account of all the best fruits here cultivated,

* Their mischievous agility in climbing is impaired by cutting the sinews of the hindfeet.

vated, with their variation from local causes; collect all the various names of the same fruit, and fix one as national, to prevent a confusion that often frustrates information both foreign and domestic.

Fish-ponds are useful decorations in places distant from lakes and rivers. I have often wondered why this advantage is not derived from ponds and streams which are so common: a useless and unwholesome swamp may thus be changed into an elegant improvement. A German author has wrote a valuable treatise on the fish-ponds of Bohemia. The subject has also been well treated by several oeconomic writers of Sweden: in which country fish-ponds of all kinds are very common.

ARTICLE. Physico Mathematica enquiries.

Machines for abridging human labour are especially desired in America, as there can be no competition between them and the arms of industrious labour, while these have full employ on her extensive lands; which must be the case for ages. Agriculture has the first claim to the exertions of mechanical genius, as the principal source of national prosperity. Extent of territory, improved by artificial industry, must yield a great quantity of products at so cheap a rate, as to bear exportation to very distant markets. It is moreover a weighty consideration to the humane philosopher, that agricultural mechanism would in the Southern states supply the labour of slaves. Among important desiderata we may place these—A machine for sowing broad-cast, so as to spread the grain even and in proper quantity: another for cutting drains, and making banks on our extensive marsh-meadows: an apparatus for clearing new lands; which ought to be a compound of coulters, saws, axes, and screws; so that the trees may be pulled out of the ground, cut in convenient pieces, and heaped: a better instrument for reaping than the common sickle, such f. e. as the cradling scythe of Northern Europe: temporary sheds of easy and light construction for the preservation of the reaped grain in wet seasons.

The many shipwrecks that happen on the extensive, and often stormy coast of this country render diving bells very necessary; these machines are yet but little known.

A plenty of naval stores, and numerous ports render ship-building an important branch of national industry. This noble art, which has long been cultivated with success, would still be much improved by more expeditious modes of hauling timber, and of preparing the main pieces for the finishing workmanship.

An extensive inland navigation by locks and canals, is now become a great object of legislative care in several states; it is to be hoped, that such persons may be entrusted with these important works; as have a perfect theory of hydraulics, and a practical knowledge of local circumstances, among which the force of ice in winter, and of rainy torrents in summer, are to be duly estimated.

As many new towns and villages will gradually rise with the increasing population of the country, their situation and form should be chosen with a view to permanent circumstances. A sure supply of water is one great object. If the advantage of ports is desired, enquiry should be made whether the present water-courses are likely to continue; as in the old countries, several towns have been immersed, and others left far within land, by the increase or diminution of the water, or by the change of the channels. Health and convenience require several open squares, wide streets, and a direction of them calculated for shelter in the winter, and for shade and ventilation in the fervent summer months.

Our architecture claims the following remarks—The position of houses ought to secure the fanning summer breeze, and exclude the wintry blast. Another object should be to exclude from summer-rooms, the burning sun, during the hotter part of the day. Entries throughout the house are very common, but not generally in directions that best answer these purposes. The length, and by frequent intervals, severity of winter in the northern and middle states, makes warm rooms not only agreeable, but in a degree necessary. For this purpose the most improved chimneys and iron-stoves are inadequate expedients: especially as the open kind of these, though the more pleasant, yet consume a great quantity of wood. The stoves, which have long been in use through Sweden, and a part of the neighbouring countries, are unquestionably the best ever yet devised: they warm the room uniformly, with a quarter of the wood required for these last mentioned; are free from any disagreeable steams; and have the appearance of elegant furniture*. Larger farms require several buildings; especially in cold countries, where store-houses, and warm dwellings for domestic animals are necessary. If all these structures are formed on regular plans calculated for the values of estates, and respective local circumstances, the useful and agreeable may be united

* They are constructed by an iron grate-work, and panes of a fine clay fitted therein, which are varnished according to taste and ability. At Bethlehem, in Pennsylvania, an inferior kind of these are already in use.

united in a very high degree: a well-written treatise on this subject, would be very valuable.

To form with speed and conveniency a tolerably accurate map of the United States, astronomical observations ought to determine the latitude and longitude of those places, which are most essential to the figure of the whole country, or to the situation of certain parts in a political, and œconomical view.

Exact surveys of private estates are indispensable for the security of landed property: from a defect of such many law-suits have originated and will ensue for years. I omit what is the province of government in this matter; and only suggest a wish, that a small treatise on the survey of woodlands might be composed; as the best English guides, being calculated for an open country, do not particularly attend to this branch.

4. *ARTICLE, Inquiries in Natural History.*

Natural history, like a faithful guide, leads us through the mysterious mazes of nature, and opens to our enraptured eye her sublime and beautiful wonders. How many precious plants are as despicable weeds trod under foot in every part of the world! How many new qualities are from time to time discovered in productions, which have been known for centuries in countries long ago perlufrated with this sacred lamp! what treasures may we not then expect in this new and vast division of the globe! in the forests of a thousand miles hitherto traversed only by savage tribes, and mercenary traders; in our lakes, some of which are inland-seas; and rivers that wander through several states before they meet the ocean! * neglect of natural history under circumstances so alluring would indicate a want of rational taste. I often heard the great *Linnaeus* wish that he could have explored the continent of North America; may this wish animate American philosophers.

The vegetable realm claims our first attention. Let us begin with a research of the stores it offers for the preservation and recovery of health. The frequent appearance of trees, shrubs, and plants, whose taste and scent, or analogy with well known pharmaceuticals, is very promising, would lead us to expect a very considerable stock of native *Materia-Medica*. But, although above an hundred of these species are, or have been, more or less in use among the inhabitants, † very few of them
are

* The United States extend from the Atlantic to Mississippi, and from Florida to Canada; taking in half of the great lakes, and of all the rivers, by the boundary-line.

† Indefinite calculation from written and verbal accounts, with personal observation.

are well known as to the extent and peculiarity of their qualities, and a very small number is adopted either by the apothecaries, or regular physicians. On this view the following expedients merit attention—to substitute indigenious medicines of equal value for those imported, which by quantity or price cause a great national expense; and that are liable to adulteration, or depreciation by age: to point out the best native plants in local districts, with fixed names, clear descriptions, and accurate medical instructions, for safe convenient and general use: to appreciate the merit of those drugs, which are esteemed specifics in the worst epidemic or particular distempers. Collecting all the botano-medical information at present attainable, we may judge what plants are most interesting, in what degree they are known, and how this knowledge may probably be most improved*—the Indians have several remedies against the diseases and accidents arising from the climate, and their savage mode of life; as fevers, rheumatism, wounds, bruises, scalding, chilblains, bite of venomous serpents; besides emetics, cathartics, sudorifics, and dietics. These have the sanction of time and simplicity. It is also generally believed, that they possess very important secrets, of which only a few extraordinary specimens are related with plausible authenticity—In domestic practice, particularly of the country people, we observe medical plants of general salubrity, used as detergents, tonics, sudorifics, and laxatives; and others of particular virtue in rheumatism, fevers, pectoral ailments, visceral obstructions, ulcers, external hurts, poisons, female complaints, and diseases of children. Among the great number of these popular drugs, particular attention is due to those that are recommended by their salutary effects, attested by the patients or other persons of credit; and more so, when the testimonial is attended with a precise statement of facts. In case of defective information, we may expect valuable qualities in those which are in vogue over large districts; because this general esteem cannot be owing to imitation in a country, where intercourse between distant places has till of late been very limited, and where botanical curiosity is yet very rare.—The medical plants we have in common with other countries, possess the same virtue, under variations from climate and local circumstances; the too common opinion of their inferiority

* See *materia medica Americana potissimum regni vegetabilis*, by David Schoepf, printed in Germany 1787. The author has great merit in collecting the accounts of preceding writers, whose authority he cites, with addition of popular information received, and personal remarks made during his residence and travels in this country.

ority will often be changed by a fair trial. Different species also promise a reward of examination from the generic similarity: when these are actually in use among the people of this country, the probability of their value is the greater.

An application of these principles will bring the following plants to our particular notice—Agrimony, *Potentilla-quinquefolium*, *Polygonum-bistorta*, *Gentiana*, *Fumaria*, *Angelica*, *Cochlearia*, *Erysimum officinale*, *Arum*, *Symphitum*, *Jnula campana*, *Afarum*, all grow in the northern and middle states; and are the same with, or near a-kin to those classed among the best simples by Dr. Cullen in his *Materia Medica**. The gentiana growing in the *glades* of Pennsylvania, is by Dr. Sch. esteemed the best of our several species. The *Arum* of North America is generally called Indian turnep, from its ancient value among the Indians; and often used with other ingredients by the country people, in that general debility, consequent on tedious fevers.—The best recommended remedies against intermittent fevers, are *Cornus florida*, Dogwood; *Ouercus phellos*, Live-oak; *Perisimon*; *Lonicera symphoricarpos*; by their barks: *Pyrola maculata*, with the Indian name *pipisfeva*: *Sambucus canadensis*: *Laurus affinis*, Spicewood, Benjamin-tree, Benzoin. The first is more generally known: a decoction of the bark has in many cases been effectual; it is by some deemed equal, when fresh, to the Peruvian: † The second is much valued in the south, its native place: that of *Perisimon* in North Carolina; and of *Lonicera symphoricarpos* in Virginia. ‡ An infusion of the plant *Pyrola maculata* has been frequently used for some years in Pennsylvania, under the name of *pipisfeva*. § The *Sambucus canadensis*, Red berry elder, is by the Indians called the *fever-bush*; a decoction of its wood and buds being of ancient renown among them. ¶ The *Laurus affinis*, Spicewood, Benjamin-tree, is also distinguished with that name by the people in the northern parts, for the salutary decoction of its wood and leaves. || The bark of the *Liriodendron*, *Tulip-tree*, is also very generally esteemed a good substitute for the peruvian: especially that of the root. We may observe on these and other febrifuges,

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that

* Confer this book with Dr. Schoepf's, and John Bartram's notes to Short's *Medicina Britannica*, reprinted in Philadelphia, 1751.

† Kalm says that in West-Jersey many were cured by the bark of the root, who had in vain tried the peruvian: in that sickly country, I have myself made use of it, and think it worthy of a full trial.

‡ Called St. Peter's wort, Indian currants; a species of honey suckle; see *Arbust. Amer.* of Marshall.

§ See ditto: a species of winter green.

¶ *Geschichte der Mission der Evangelischen Brüder unter den Indianern in Nord America*, by *Loëkiel*, published 1787.

|| *Memoirs of the American Academy etc.* printed in Boston, 1785.

that the variety probably corresponds with the diversity of the fevers, which is very considerable from latitude, season, and personal constitution: thus f. e. the above spicewood is of peculiar benefit in that moderate but tedious kind, called *slow fever*, which is almost continual.

Against rheumatism these are worthy of trial—the root, in decoction, of *Aralia spinosa*, Angelica tree: the cones of *Pinus strobus*, White pine: the twigs and roots of *Magnolia glauca*, Swamp-sassafras, both in decoction, and bath: the fresh bark of *Juglans alba*, Hickory, applied externally; much used by the Indians. *

Dysentery has been cured by the bark and gummi of *Liquidambar styraciflua*, Sweet-gum; *Cynoglossum Virginianum*, (foliis amplexicaulis ovatis) Hounds-tongue; *Triosteum angustifolium* floribus oppositis pedunculatis; the root of White oak in powder.

Antidropsical well recommended are, the leaves of *Callicarpa Americana*: † the root, in decoction, of *Aralia nudicaulis* (foliis binis ternatis; that of *Sassafras* in extract.

Cholick is removed, by the oil of the above Spicewood-berries: the flatulent and hysteric kind, eminently so by *Angelica lucida* (foliolis æqualibus ovatis inciso-ferratis) called therefore *belly-ach-root*.

The best among pleuretic remedies must be the *pleuresy-root*, so much extolled in Pennsylvania, described by Schoef *Asclepias tuberosa*, foliis alternis lanceolatis, caule divaricato piloso: another *asclepias* bears high value in Maryland; called also *butterfly-root*: the *asclepias decumbens*, *pleuresy-root*, mentioned by Mr. Jefferson in his *notes on Virginia*, must be one of these. The bark and berries of the above *Magnolia*, either in decoction, or infusion of spiritous liquors, is generally salutary in those great *colds*, which affect the sides, back and breast, with painful *fitches*, attended with febrile chills and general languor.

Anthelmintics are the *Chenopodium*; ‡ and the *Spigelia Marylandica* (caule tetragono, foliis omnibus oppositis), Carolina pink; a southern plant: it will destroy the worms; but caution in the dose is requisite.

Spiræa trifoliata (foliis ternatis ferratis subæqualibus, floribus subpaniculatis) *Ipecacuanha*, Indian physic, *Baumont-root*, is an effectual and safe emetic. *Podophyllum peltatum*, (foliis peltatis Palmatis) May apple,

* They drive the pain from one place to another, until it breaks out in a blister: this bark burns the skin, as it were, Loikiel. In New-England a species of *pyrola* called *rheumatism-weed*, and one of *Aletis* named *unicorn*, are reputed very efficacious; the latter in the chronic rheumatism. Mem. A. Ac.

† A shrub growing in the southern states, Arbust. Am.

‡ Jerusalem-oak.

ple, is lately coming into practice as a laxative by an extract of the root that removes its emeric quality.* *Convolvulus panduratus* grows in the middle latitudes; and in the south some species similar to the *Convolvulus Jalappa*, not well explored.

Ulcers and cancerous sores are frequent among those whose humours are vitiated by perennial fevers: in a variety of remedies these deserve notice—*Iris versicolor*; ashes of *Magn. glauca*, in form of plaster; and a strong bath of *Sassafras-root*, have cured ulcerated legs. The root of *Saururus cernuus*, (foliis cordatis petiolatis, amentis solitariis recurvis) *lizard-tail*, bruised and applied as a poultice to sore and impostumate breasts will ripen and heal them. A species of *Nigella*, called *gold-thread*, Indian *mouth-root*, is an excellent remedy for an ulcerous mouth.† In New-England a species of *Geum*, *water-avens*, *throat-root*, *cure all*, is an esteemed remedy for ulcerated fore-throat: a decoction of the root is both a gargle and drink.‡ *Rumex acetosella*, floribus dioicis, foliis lanceolato-hastatis, *flower-dock*, *cancer-root*, is recommended against inveterate ring-worms: this is biennis and found over the whole country; the juice is mixed with vinegar: (Shcoeph) Another is mentioned in the Boston-Memo. the root of which in decoction is used in fore-throat. The *Phytolacca decandra*, floribus decandris decagynis, *Poke*, has of late given promising experiments in the cure of cancers: the juice of the berries is inspissated by the sun: the young sprouts in spring are eaten as sparagras; but grown too far they are violently catartic: this bush is a general grower.

Preservatives against venomous snakes seem to be scattered over the whole country, and they merit full investigation, in order to provide prompt remedies, in every place, and against different kinds of serpents; especially in the new settlements. *Convolvulus purpureus*, *purple-bind-weed* is very powerful, if the Indians can handle rattle snakes after anointing the hands with its juice, as *Catesby* relates: this grows in the South. A species of *Jussiaea* is mentioned in the cited memoirs, as growing in the northern countries near the haunts of rattle-snakes, called *Rattle-snake plantain*. The *Hieracium venosum*, foliis cuneiformibus hirtis, scapo nudo crassissimo erecto) grows from the north to Virginia inclusively;

* The first grows in the northern and middle states, the latter in these and the southern; it bears on a stalk of two feet a yellow fruit like a lime, of a sweetish taste.

† Lofkiel: mem: of the American Academy; the root is like a ball of shining thread.

‡ Floribus nutantibus, fructu oblongo, aristis plumosis: powder of the root is used by the Canadians in fever and ague; Am. Ac.

is called *poor Robins plantain*; and said to frustrate the bite both of the rattle snake, and of his supposed precursor the *pilote-snake*. Erigeron, likewise called Roberts plantain in Pennsylvania, is described by Dr. Schoef thus (radix repens; folia radicalia ovata, basi attenuata, dentata dentibus paucis a medio ad apicem glanduliferis, obtusa, pilosa, venis paucis. Scapus biuncialis, pedalis, striatus, villosus, uniflorus etc. etc.) Dr. Otto, a respectable practitioner, informed him that the herb ought to be given in a plentiful decoction, and also applied with the root to the wound. The herb of *Solidago virga aurea*, Golden rod, is used in the same manner. * The root of *Aletris farinosa* is taken in powder, or bruised and steeped in liquor: this root is called *star-root*, *blazing star*, *devil's bite*, and greatly esteemed, both by the Indians and the people of several states, for many qualities. † The *Polygala Senega* is well known. The *plantain* of Negro Cæsar I just mention with a wish, than an authentic account could be obtained of the experiments for which he obtained a public reward. Many credible testimonies agree in the fact that Indians have extraordinary skill in curing the bites of serpents; but whether any specific antidote is known, appears doubtful: the plants in use act however as powerful sudorifics and absorbents: a narrative of my own observations on this matter would here be too prolix.

Of late years madness of dogs has been more frequent: the *Swertia difformis* recommended by Clayton, should be tried.*

In the search of new medicines, spicy trees and balmy ever-greens are particularly inviting. The swamps of the low country abound in plants of aromatic scent: the magnolia glauca so frequent in them seems to hold out her fragrant lillies and crimson-berries to the skeleton-prey of Stygian vapours; probably her lovely sisters are also compassionate.‡

Indigenous esculents claim attention in several views. Those roots, herbs, grains, and barks, that in case of need can support life, may be useful to travellers in the wilderness and to troops that carry on an Indian war: the savages make this use of the inner bark of the elm, and the roots of *Aralia nudicaulis*. The fallads of many kinds, gathered in diverse parts of the country during spring, should be generally known. Several wild fruits might be improved by culture; as walnuts, crab-apples,

* Schoef describes it as *bisfuta, radice amara*: Bartram as "having slender purple stalks, rising a foot high, with a spike of fine yellow flowers, for near one third part of the length of the plant," says it is much extolled.

† Bartram speaks of it principally as a "remedy in grievous pains of the bowels;" and says it has a stalk eighteen inches long with a fine spike of white flowers six inches, blooming in June, growing plentifully in the back parts of the country. * See Gron. Virginia.

‡ Serpent. Virg. Saraparilla, etc. want no mention: several cannot here find room.

ples; papaws, (*annonia*) plumbs, grapes, persimons, honeylocust (*Gleditsia Triacanthos*); some persons have planted orchards of this and made plenty of metheglin from the sweet pods. While the Sugar-maple is of late justly valued, its kindred also merit more attention: I am credibly informed that in Canada, equally good sugar is made from the weaker juice of the Red maple; a tree that abounds through all the states. The Chefnut oak is said by Schoef, to yield in spring a copious agreeable drink: other trees may have similar saps. Aromatic plants deserve notice: the barks of young Sassafras, and of *Calycanthus Floridus* * much resemble cinnamon: the *Acorus calamus* is under name of Spice-wort, used in Massachusetts. The plants used as tea in diverse parts deserve examination: the *Cassine*, called South tea-tree, is obscurely known by us, but has long been famous among the Indians. †

Many vegetable dyes are already in use, both among the Indians, and the inhabitants: some of them are also recorded by writers: but a collection of scattered practice, and a selection of the best in every kind, are yet wanted. In this branch, the practice of other countries may also be adopted: thus the *Rhus-toxicodendron-vernix*, Varnish-tree, Poison-ash, is probably the same with the valuable species of Japan. ‡

Saps, roots, leaves, flowers, barks, may be useful in a variety of modes; for example—The roots of *Aesculus Pavia*, *scarlet horse chefnut*, and of *Jucca filamentosa*, *silk-grass*, are used for soap: § chefnuts can be prepared for the same use. The two kinds of *Myrica*, Candle berry myrtle, are known: the *Melia azedarach* grows in the South, under the name of *bead tree*; but its berries are not yet in use for tallow, as in Japan *. The *Asclepias*, called *silkweed*, has a fine white down in its pods, which in Massachusetts, is carded and spun into very good wick-yarn. While oaks abound, an extract of their barks might, as an article in tanning, be a valuable export.

Vegetable medicines for cattle are very interesting: a critical comparison of European treatises, with what is written and practised here will point out the best.

The

* Called Carolina allspice.

† They call it *Yaupan*, and drink an infusion of the leaves in copious draughts, both as a diætic and inebriating. It grows near the sea in the southern states, ten or twelve feet high.

‡ By the travels of Prof. Thunberg (in Swedish, I find great analogy between Japan and N. America: thus the Persimon grows there: the cones of the Alder are in common use for black dye.

§ They grow in the southern states.

* An oil is pressed which becomes equally solid with tallow. *Thunberg*.

The beauties of our Flora are yet displayed only to those admirers, who have sought them, in fields and woods, from spring to autumn, in northern and southern climes, in the grand Magniflora and the humble lilly of the valleys. Many of the wild flowers would adorn gardens, and embellish groves and meadows: but a great part of these are known only in their native places, and some have not even obtained a vernacular name. Flowery shrubs are gradually coming into more notice; and some of the finest will endure the winter of Pennsylvania: the *Chionanthus* (*Snow drop*, *Fringe tree*,) *Calycanthus floridus*, *Bignonia radicans* (*Trumpet flower*) and the beautiful *Franklinia*, all grow well near Philadelphia. * Several of the trees most agreeable by foliage, bloom or lofty growth, have a spontaneous wide range; and others will under a skillful hand pass their natural limits.†

My remarks on the Animal domains shall begin with the small tribes, because some of these do us remarkable mischief. The *Hessian fly* has for several years made great havock in the wheat fields through all the middle-states. ‡ The canker worms, caterpillars, and other vermine lay waste our orchards: some remedies will hopefully result from the enquiries of late begun in several places. Hosts of locusts some years infest the woods, and cause considerable damage by devouring the leaves of trees over large districts, many of which decay when thus exposed to the burning sun: they lie in the ground for a period of years, not yet ascertained; appear in the latter part of the spring, when the oaks are in perfect foliage; and in a few weeks disappear.§

Venomous insects are rare, and obscurely known, as they seem confined to the woods. A species of these, called *mountain spider*, that haunts the inner parts of the southern states, is said to be large; strong enough to take small birds in his net; and by his sting to produce violent pains at the heart, inflammations with alternate cold sweats, tremors, frenzy, and death, if proper cure is not obtained. In the middle states there is a black spider, whose bite causes great pains and a transient blindness, but is not mortal. A large ant with a long sting, common in Maryland and further south, is also very noxious.

Among

* The last is in Mr. Bartram's garden fifteen a twenty feet high; and has not been affected with the five severe winters within twelve years, though its native place is Georgia. The flowers are large and fragrant with lilly-like petals, and a tuft of gold-coloured stamina.

† *Bignonia Catalpa* flourishes in and beyond Pennsylvania.

‡ Nettle in the joints of the stalk, they bite it off before the grain is ripe.

§ They seem to extend far, as many hundred acres upon the Ohio are said to be spoiled by them; yet is their depredation local and varying, so that different parts have their turn: they were in Pennsylvania eighty years ago, and with the same qualities, as I find by the old Swedish records, which also add that the Indians fed upon them.

Among our handsome insects the *fire-fly* is the first: thousands of these illumine our summer nights, and by their gambols in the air, present a sky full of falling stars;* but we know not where these lamps are hid in the long winter-nights.

A striking mechanism is remarked in the *horn-beetles* of various kinds; and especially the *wood sawer*, who with two curve inwardly dentated prongs, can cut off small twigs of trees. I venture to add a *zoophyton* in the Ohio country, which alternately is vegetable and animal.† But without such extraordinary phænomena, the œconomy of the numerous little animals is wonderful enough to awaken our attention, especially in this country, where it is yet unexplored.

Thirty a forty species of snakes are counted; but several are very imperfectly known; especially those who are rare or local. The *horn-snake* is now seldom seen; but many accounts agree, that the spur of his tail is so venomous, as to kill young trees, if by accident it strikes them; which has with minute facts been told me by some ancient Swedes. The *king-snake* of the South, is not seen (I believe) far North. The *double-headed* snake may be a monstrous production; but two specimens of it are found in New-England, and two more are now in Mr. Peale's Museum. That some kinds of serpents charm birds and squirrels is a fact; but in what manner we know not. Fortunately the smaller number is venomous; but which species should be avoided is an interesting question: though the *green snake*, unperceptible in the grass, is harmless; some that occasionally come near houses, are not so.

On quadrupeds in general, two inquiries are interesting: what is the specific difference from those of the same genus in the Eastern world? and how doth the same species vary here under different latitudes? in the first our *tygers* and *panthers* require particular notice: in the second the bear, who frequents the interior country from North to South; and this panther, who has also a wide range. Among those peculiar to North America the *Moose-deer* is yet undescribed, and known to few persons

* Thunberg describes those of Japan in the same manner, under name of *Lampyrus Japonica*.

† This was communicated to me by a respectable Missionary, who had long been among the Indians, and had seen this animal; but would not have his name mentioned, as the matter may appear incredible: it is 3 a 4 inches high, and after having crawled about the woods, is fixed in the ground, becoming a plant with a stem through its mouth etc. It is analogous to the vegetable fly of Dominica, that buries itself in the ground, dies, and springs up like a young coffee-plant; for which it is often mistaken, untill the root upon examination is found to be the head, feet, and body of the animal: see the Natural history of Dominica by Th. Atwood, published 1791.

persons below the South of Canada*. The *Opoffum* common among us, and long known for singularities, is yet unexplored in the greatest of all—to wit that the female breeds her young at her teats within the false belly: many persons in distant quarters assert that they have seen them adhering to the teats when small as a pea. The vast Mahmot, is perhaps yet stalking through the western wilderness; but if he is no more, let us carefully gather his remains, and even try to find a whole skeleton of this giant, to whom the elephant was but a calf†.

The great herds or buffaloes in the Western country, are a valuable national possession; a wanton destruction of them should be checked; and trial of domestication would perhaps be both practicable and useful.

The greater number of birds in the old settlements have been described; but many equivocally: and our knowledge of their habits is in general very small. We should not indiscreetly destroy those deemed of no value; who knows what part is assigned to them in the œconomy of nature? perhaps our numerous tribes of woodpeckers save many trees from destructive worms? as to the useful and ornamental birds, they demand our protection against licentious and greedy tyranny: the beautiful and melodious birds diminish fast; and the Turkeys once so abundant, have long ago been drove into the remote woods.

General knowledge of our fishes is very limited and confused: of those in the western waters we have here only reports; I never had even from eye witnesses a tolerable account of the *cat-fish* that weighs 70 a 100 pounds. Those proper in fish ponds cannot be selected without knowing what kind of water, food, &c. they require.

Natural history demands more esteem from our seminaries of learning: the principal among them should immediately form botanical gardens, on a plan so liberal as gradually to receive all the trees, shrubs, and plants most valuable in every respect. Museums are also very important, for exhibition of both native and foreign productions‡. Finally, it is necessary to fix general names for every vegetable and animal of public utility, that great numbers may receive and impart information.

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* Some years ago one was exhibited in Philadelphia: it is a large animal with very high forelegs, a short neck, &c. On the American Elk see Jefferson's Notes on Virginia.

† Great quantity of his bones are found on the Ohio: see Jefferson's Notes.

‡ That of Mr. Peale in Philadelphia, commenced a few years ago, is by his laudable care coming into reputation both at home and abroad, and merits the public patronage.

5th ARTICLE, *Meteorological Enquiries.*

Changes in the atmosphere have such important consequences on the affairs of human life ; that the art of prognosticating them is very beneficial. It has of late years been cultivated with great assiduity in various parts of Europe ; and the series of observations will gradually form a system, that may at least, unite probable conjectures with much certain knowledge. Several circumstances of the United States point out corresponding inquiries—We are subject to sudden gusts of wind, and some tornados that rapidly pass over a space of one or two hundred miles : from the beginning of Spring till the setting in of Winter, these occasion many unhappy accidents on our extensive coasts, and ample navigable rivers. Their transient strokes are, however, not comparable to those severe storms that generally visit us two or three times in that season : after these the gazettes announce numerous deplorable shipwrecks, and other disasters : coming from the East with heavy rains, they generally cause inundations, which overflow a vast extent of meadow grounds, on the lengthy rivers and winding creeks, and sometimes damage wharves and stores of commercial towns. A foresight of all these would enable us to elude their fury : vessels might stay in port, or seek a shelter : merchandize might be secured : the hay might be removed, and the cattle, which sometimes perishes by the sudden rise of the water. In summer the sudden gusts happen generally towards evening, after a sultry calm for some hours : when attended with thunder and rain, warning is given by the rising clouds : those with a clear sky are less frequent, and preceded only by light eddies in the air for some minutes*. The tornados are probably announced by some remarkable symptoms, though their happily rare occurrence has prevented attention : the air is (I believe) very sultry for two or three preceding days, and on the last, somewhat hazy with tremulous light breezes from the West. The easterly storms are ushered in by the gradual thickening of the clouds, and encrease of the wind for many hours : †

The irregularity of our seasons, is a great impediment in the business of social life—The fallacious appearance of an early spring often invites the husbandman and gardener to planting and sowing, which will be injured by severe frosts and cold rains. The beginning of winter varies also by several weeks : after the first of December, mild weather is often changed into a cold, that within two or three days fills the rivers of the

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northern

* These are generally called whirlwinds from their versatile direction.

† When they continue for two or three days, they are not at their height before twelve hours.

northern and middle states with ice; by which vessels outward bound are detained, and those coming on the coast suffer severely. A greater disadvantage of this variation, is uncertainty of the seeding-time, on which much depends the future crop: if it is too early, the luxuriance of autumnal vegetation exhausts the root; if too late, it cannot acquire sufficient firmness to bear the frost. We have two prognostics of winter which are founded in nature: the migration of wildgeese shows that the northern waters are freezing, and that we may expect severe north westerly winds: abundance of rain, by cooling the air, and wetting the earth, prepares both for the impression of the frosts: increasing number of partridges, pheasants, and other ground birds in the populous parts, with the appearance of bears, doth also indicate that the western woods are already covered with snow. Mild winters are always succeeded by cold springs*. Early thunder is a sure token of immediate cold weather for a week or two. The progress of the vernal season would most probably appear from an accurate *Calendarium-Flora*: the bloom and foliation of some trees being unfolded not by an occasional warmth of the air, but by a gradual penetration of the heat to their deep roots, proves at least an ascendancy of the vernal temperature not easily overcome by the northerly gales.

A continuance of wet weather in time of hay-making, is not very common, but, when it happens, very destructive by the heat of the season. It is to be apprehended after a long drought; and is generally foreboded by a moisture in the air, visible on glass, walls, wooden furniture, salt, and other attractive bodies, for two days. As grass may be cut somewhat sooner or later, its preservation may be obtained by this foresight. The harvest of grain can bear no delay, especially in a hot climate; but dispatch is necessary in a critical time.

The sudden alterations of cold and heat throughout the year, would often be less injurious to health, by foreseeing them: general rules are these—excessive warmth for the season seldom continues above a few days, and quickly changes into the opposite extreme: fine days in winter, spring, and latter part of autumn are immediately succeeded by cold and wet, rain or snow, according to season and latitude; wherefore they are called *weather-breakers*.

The

*Long experience has given rise to the adage, *winter never rots in the sky*, and to the Indian tale still generally so called, that *winter must come when the ponds are full*.

The limits of an essay exclude a detail of observations made by myself, or collected from judicious persons, and of their more general, or local and temporary application: I wish that curiosity roused by facts may be further animated by this reflection—In the works of Almighty power and infinite wisdom there can be *no chance*; the seasons revolve on the same fixed principles as the planets; and the apparent disorders lessen with our encreasing knowledge. The bountiful Creator discovers his marvels in proportion to our wants; if man has by a sublime sagacity traced the intricate path of the moon, why may he not explore the source of the tempest? every country has native remedies against its natural defects; is it not then probable that as the *Polygala Senega* was given us against the rattle-snakes, so may we have faithful prognostics of the dangerous caprices of our climate? Let us therefore study nature, and nature's Ruler shall reward our labour.